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Section II. (REMARKS)

Amendment of Claims 14 and 27-29; Addition of New Claims 31-34

Claims 14 and 27-29 have been amended to replace the phrase “means for modulating the copper electrochemical deposition” by recital of “a control assembly adapted to modulate the copper electrochemical deposition.” No new matter (35 USC 132) has been added.

The replacement terminology in claims 14 and 27-29 is fully consistent with and supported by the as-filed disclosure of the application. See, for example, paragraph [0037], line 4 (“control valves”); paragraph [0038], lines 1-2 (“control relationship with the computational module 36”); paragraph [0038], line 4 (“control function”); paragraph [0039], line 1 (“control valves”); and paragraph [0053], line 4 (“control infrastructure”).

Claim 27 has been amended to recite the control assembly as comprising “components” specified in a Markush group, consistent with the disclosure at page 8, lines 2-5 of the specification (“[T]he modulation may in like manner involve adjustment of system hardware components or change of process conditions to maximize the plating rate, plating uniformity, etc., as desired in a given application of the invention.”)

New claims 31-34 have been added herein, to encompass specific aspects of the invention.

Claim 31 is of dependent form under claim 14, and recites that the apparatus is operatively coupled with the electrochemical deposition system to control copper deposition therein. Such arrangement is thematically shown and described in connection with FIG. 2 of the application; see page 11, paragraph [0035] to page 15, paragraph [0046] of the specification.

New claim 32 is of dependent form under claim 31, and recites that the electrochemical deposition system comprises a wafer as an electrode component of an electrochemical cell, consistent with the disclosure at paragraph [0054], lines 1-2 (“utilizing the wafer being plated as an electrode component of an electrochemical cell”).

New claim 33 is of dependent form under claim 32, and recites that the at least one dependent variable (see claim 14) comprises a wafer-based electrode parameter, consistent with paragraph [0053], line 1 (“wafer-based electrode parameter”).

New claim 34 is the dependent form under claim 33, and recites that the wafer-based electrode parameter comprises a parameter selected from the group consisting of plating voltage output, plating current, electrode size, cathode preconditioning pulse current, and cathode reconditioning pulse voltage, consistent with the specification at paragraph [0053], lines 2-3 (“wafer parameter such as plating voltage output, plating current, electrode size or cathode preconditioning pulse (current or voltage)”).

It therefore has requested that the new claims 31-34 be consolidated with the Group I claims 14-30, under which the new claims 31-34 are dependent.

Elections/Restriction Requirement

In the June 9, 2006 Office Action, the Examiner imposed a restriction requirement against claims 1-30, and required that an election be made between:

- Group I: Claims 1-13, drawn to a method, classified in class 205, subclass 121;
- Group II: Claims 14-30, drawn to apparatus, classified in class 204, subclass 228.1.

Applicants hereby elect, with traverse, Group II claims 14-30.

The restriction is traversed as being based on an incorrect premise. Specifically, at page 2 of the June 9, 2006 Office Action, the restriction was imposed on the basis that

“the apparatus [of the Group II claims] can be used to carry out processes other than that of the Group I claims. For example, the apparatus could be used to control electrodeposition of metals

other than copper onto substrates other than a wafer.”
(Paragraph 2, lines, 5-7 of the June 9, 2006 Office Action).

In fact, the apparatus is specific to copper deposition on wafer substrates. Independent claim 14 of the Group I claims recites, *inter alia*,

14. (Currently amended) Apparatus for controlling copper electrochemical deposition in an electrochemical deposition system in which a wafer is contacted ... to effect plating of copper on the wafer, .. comprising:

a computational module constructed and arranged to perform the following steps:

selecting at least one dependent variable correlative of efficacy of the copper electrochemical deposition;

performing a regression analysis or multivariate calibration modeling of the copper electrochemical deposition utilizing a wafer-based independent variable to generate a dependent variable equation for each selected dependent variable correlative of efficacy of the copper electrochemical deposition; and

solving the dependent variable equation for each selected dependent variable correlative of efficacy of the copper electrochemical deposition, by regression analysis, to yield a solution value for each selected dependent variable; and

a control assembly adapted to modulate the copper electrochemical deposition in response to the solution value for each selected dependent variable.

It therefore is apparent that the apparatus is copper- and wafer-specific, with the computational module, as claimed, being specifically constructed and arranged for processing of copper- and wafer-specific data, and the control assembly, as claimed, being specifically adapted to modulate copper electrochemical deposition on a wafer.

Therefore, the apparatus as specifically claimed cannot be used to control the electrodeposition of metals other than copper on substrates other than wafer substrates, since it is “constructed and arranged” and “adapted” to electrodeposition of copper on wafer substrates.

The contrary contention of the Office, that “the apparatus could be used to control the electrodeposition of metals other than copper on the substrates other than a wafer,” would in fact

require the computational module that is "constructed and arranged" for "modeling of the copper electrochemical deposition, utilizing a wafer-based independent variable." to be re-constructed and re-arranged for an entirely different purpose and application.

Accordingly, the basis for the restriction requirement fails, and the apparatus and method claims therefore merit continued consolidation for search and examination purposes.

Independent of the foregoing, such continued consolidation of the Group I and Group II claims also is required by the operation of the restriction statute and applicable MPEP provisions.

35 USC 121 requires that:

"[I]f two or more independent and distinct inventions are claimed in one application, the Director may require the application to be restricted to one of the inventions."

MPEP Section 802.01 (Meaning of "Independent" and "Distinct"), states, *inter alia*, that:

"The term 'independent' (i.e., not dependent) means that there is no disclosed relationship between the two or more subjects disclosed, that is, they are unconnected in design, operation, or effect..."

It is apparent from this provision of the MPEP that the subject matter of the Group I and Group II claims is not "independent" within the meaning of 35 USC 121 in the respective claims, and that therefore Groups I and II are NOT properly restricted. See, in this respect, representative claim I of Group I, which recites, *inter alia*,

selecting at least one dependent variable correlative of efficacy of the copper electrochemical deposition;

performing a regression analysis or multivariate calibration modeling of the copper electrochemical deposition utilizing a wafer-based independent variable to generate a dependent variable equation for each selected dependent variable correlative of efficacy of the copper electrochemical deposition;

solving the dependent variable equation for each selected dependent variable correlative of efficacy of the copper

electrochemical deposition, by regression analysis, to yield a solution value for each selected dependent variable; and

modulating the copper electrochemical deposition in response to the solution value for each selected dependent variable.

and compare such recited subject matter with corresponding recitation in representative claim 14 of Group II

a computational module constructed and arranged to perform the following steps:

selecting at least one dependent variable correlative of efficacy of the copper electrochemical deposition;

performing a regression analysis or multivariate calibration modeling of the copper electrochemical deposition utilizing a wafer-based independent variable to generate a dependent variable equation for each selected dependent variable correlative of efficacy of the copper electrochemical deposition; and

solving the dependent variable equation for each selected dependent variable correlative of efficacy of the copper electrochemical deposition, by regression analysis, to yield a solution value for each selected dependent variable; and

a control assembly adapted to modulate the copper electrochemical deposition in response to the solution value for each selected dependent variable.

It thus is apparent that the subject matter of Group I claim 1 and Group II claim 14 CANNOT BE CHARACTERIZED as being "unconnected in design, operation or effect" (MPEP Section 802.01). The restriction requirement applied against Groups I and II therefore is improper.

Based on the foregoing, it is requested that the restriction requirement be withdrawn.

Further, it is pointed out that the subject matter of the respective Group I and Group II claims imposes no serious burden of searching on the Examiner, since, as shown above, the apparatus of the Group II claims is specific for controlling copper electrochemical deposition on a wafer substrate, and the methodology recited in Group I representative method claim 1 is conducted by the computational module and control assembly of the apparatus claimed in Group II representative claim 14. For this reason alone, the restriction requirement should be withdrawn,

even if the prior ground for restriction is maintained by the Office (though such ground has been shown untenable in the preceding discussion).

According to the MPEP section 803:

"[I]f the search and examination of an entire application can be made without serious burden, the examiner must examine it on the merits, even though it includes claims to independent or distinct inventions." MPEP §803.

Under the applicable criterion of this MPEP provision, all claims 1-34 should be submitted to examination on the merits¹.

Fee Payable for Added Claims 31-34

The fee payable for newly added claims 31-34, in the amount of \$100, for addition of four new dependant claims (4 x \$25/claim), is paid by the Credit Card Authorization Form enclosed transmitted herewith, directing charging of such fee to the credit card specified in the Form. Authorization also is hereby given to charge the amount of any additional fee or amount properly payable in connection with filing and entry of this response, to Deposit Account No. 08-3284 of Intellectual Property/Technology Law.

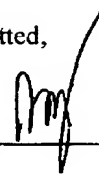
CONCLUSION

Based on the foregoing, it is requested that the restriction requirement be reconsidered and withdrawn, so that method claims 1-13 are consolidated with apparatus claims 14-34 for purposes of further search and examination.

In the event that prosecution can at any point be expedited by telephonic interaction with the undersigned attorney, the examiner is requested to contact such attorney at (919) 419-9350 so that any relevant issues can be promptly resolved, and patent issuance can be secured at an early date.

¹ If despite the compelling basis presented herein for withdrawal of the research requirement, such requirement is maintained, applicants request rejoinder of the Group I method claims 1-13 with the Group II apparatus claims, in accordance with the provisions of MPEP 821.04, in the subsequent proceedings.

Respectfully submitted,



Steven J. Hultquist
Reg. No. 28,021
Attorney for Applicants

**INTELLECTUAL PROPERTY/
TECHNOLOGY LAW**
Phone: (919) 419-9350
Fax: (919) 419-9354
Attorney File No.: 2771-688 (7492)